

Hawaiian Eucoilidae (Hymenoptera: Cynipoidea), Key to Genera and Taxonomic Notes on Apparently Non-Endemic Species.¹

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ABSTRACT

A key to the genera of Eucoilidae known to occur in Hawaii is presented. All known non-endemic species are treated except those which attack larvae of Agromyzidae (Beardsley 1988) and those of the genus *Kleidotoma* Westwood (Beardsley in press). The following three species are described as new: *Eucoila ophyrae*, *Hexacola neoscatellae* and *Rhoptomeris advena*. The following new combinations are proposed: *Chrestosema magnifica* for *Pseudeucoila* (*Hexamocera*) *magnificus* Yoshimoto, *Didyctium weldi* for *Pseudeucoila* (*Pseudeucoila*) *weldi* Yoshimoto, *Ganaspis ovata* for *Pseudeucoila ovata* Yoshimoto, and *Leptopilina rugipunctata* for *Pseudeucoila* (*Pseudeucoila*) *rugipunctata* Yoshimoto. The following new synonymies are proposed: *Hexacola samuelsoni* Yoshimoto and Yasumatsu (1965) as a junior synonym of *Micreriodes guamensis* Yoshimoto (1962), and *Hexaplasta konensis* Ashmead (1901) as a junior synonym of *Trybliographa xanthopoda* Ashmead (1896). The following immigrant species are reported as new to the Hawaiian fauna: *Micreriodes guamensis*, *Eucoila ophyrae*, *Didyctium weldi*, *Hexacola neoscatellae*, *Leptopilina boulardi* (Barbotin et al.) and *Rhoptomeris advena*. In addition, three as yet undetermined species assigned to *Hexacola* Förster are each known from a single specimen collected on Oahu.

Recently (Beardsley 1988) I treated the non-endemic Eucoilidae associated with agromyzid leafminers in Hawaii. The present paper presents a key to genera of this family known to occur in the Hawaiian archipelago, and attempts to treat taxonomically all of the species that are believed to be non-endemic (i.e. of recent extra-Hawaiian origin), except the agromyzid parasites covered earlier, and those belonging to the genus *Kleidotoma* Westwood (to be treated separately).

The term "immigrant" is used to denote species which are not endemic to Hawaii. With the exception of *Eucoila impatiens* (Say), which was purposely introduced for biological control of pestiferous flies, all such species are assumed to have been accidentally introduced within the past 200 years. Species are presumed to be immigrants if they are known to occur elsewhere in the world, or if not known elsewhere, they attack immigrant host species and/or belong to genera or subgenera that have not developed endemic species complexes in Hawaii. There is possibility for error in designating species not known outside of Hawaii as immigrants. One might question whether *Hexacola neoscatellae* Beardsley, described in this paper, should be so designated, as it attacks a presumably endemic host and is unknown elsewhere. In this case, the species apparently has no close relatives

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among the demonstrably endemic eucoilids, and the genus to which it belongs is so poorly known that it may be expected to be found eventually in some other area.

Six species treated here are apparent accidental immigrants which have been discovered in Hawaii since Yoshimoto's (1962a) review of the Hawaiian eucoilids, or were overlooked by him. These are noted as new state records in the text. In addition, three unidentified species in the genus *Hexacola* Förster, each represented by a single female specimen, probably also represent established accidental immigrants.

I am greatly indebted to Dr. Göran Nordlander, of the Swedish University of Agricultural Sciences at Uppsala, for examining specimens and providing information on generic relationships for several species treated here. The assistance of Mr. John Strazanac, who made most of the SEM photographs is also gratefully acknowledged. I am indebted to Dr. Arnold Menke, USDA/ARS Systematic Entomology Laboratory, who reviewed the manuscript and offered a great many helpful suggestions.

Morphological characters used in the keys and descriptions are illustrated in Figures 1-2. For the most part, morphological terms used here are the same as those used by earlier eucoilid taxonomists (e.g.: Weld 1952, Yoshimoto 1962, Quinlan 1978). However, Menke (personal communication) pointed out that some terms I have employed are morphologically incorrect. For example, although the antennal scape and pedicel are true segments, the individual articles of the flagellum are not, and should properly be called flagellomeres. Also, parts of the scutellum laterad and behind the scutellar plate (sometimes called the "cup") are usually referred to as the "disc" of the scutellum, although they are not disc-like in form. For these structures I have followed terminology used by earlier authors, as a matter of convenience. Similarly, I have used the old terminology for wing veins rather than converting to the Comstock-Needham system (Figure 2).

Holotype and allotype specimens of new species described here are deposited in the Bernice P. Bishop Museum, Honolulu. Reference is made to locations of types only when holotype specimens were examined by me. Type depositories are abbreviated as follows: British Museum (Natural History), London (BMNH), Bernice P. Bishop Museum, Honolulu (BPBM), U.S. National Museum, Washington D.C. (USNM).

THE GENERIC CLASSIFICATION OF HAWAIIAN EUCOILIDAE

The comprehensive work of Weld (1952) was, until recently, the principal reference to generic classification in the Eucoilidae. Yoshimoto (1962a) largely followed Weld's generic concepts. However, several European workers have restudied the type material of species upon which some of the older eucoilid genera were based (Masner 1958, 1960; Nordlander 1976, 1978, 1980, 1981, 1982; Quinlan 1978), and their conclusions have resulted in changes in generic concepts. These authors have shown that characters such as the closure of the radial cell on the margin of the forewing, and the

number of enlarged segments forming the "club" of the female antenna, which had been emphasized in the past in delimiting genera and subgenera, are relatively plastic, and have little phylogenetic significance above the species level. As a result, certain generic names that have been used for Hawaiian species are no longer valid. *Pseudeucoila* Ashmead for example, is now considered a synonym of *Trybliographa* Förster (Nordlander 1981), but none of the Hawaiian species assigned by Yoshimoto (1962a) to *Pseudeucoila* conform to the revised definition of that genus, and all must be placed in other genera. This has been done in the present paper for the Hawaiian species which are considered to be non-endemic. However, a number of apparently endemic species also were placed in *Pseudeucoila* by Yoshimoto. These will be treated in a later paper.

The problem of generic placement and relationships among endemic Hawaiian eucoilids has not yet been satisfactorily addressed. At least three separate endemic species complexes exist; two small and one very large. A small distinctive group of endemic *Kleidotoma* species is associated with endemic aquatic Ephyridae and Canacacidae (Beardsley in press). A second small, distinctive, aquatic complex (possibly 3 or more species) makes up the endemic genus *Aspidogyrus* Yoshimoto, the taxonomic relationships of which are unclear (Beardsley in preparation).

The remaining large complex is in the *Ganaspis* group of genera (Nordlander 1982) and includes *Hypodiranchis* Ashmead, *Lispthyrus* Yoshimoto, *Nesodiranchis* Perkins, *Pseudodiranchis* Yoshimoto and *Weldia* Yoshimoto. The few known hosts of species in this group are among the endemic Drosophilidae (*Hypodiranchis*, *Nesodiranchis*) and Agromyzidae (*Weldia*). *Nesodiranchis* appears to be a relatively distinct genus. However, the other genera in this complex are less readily distinguishable, either from each other or from *Ganaspis* and *Hexacola*. A comprehensive review of the *Ganaspis* group of genera, of worldwide scope, is needed to clarify the status of these genera.

KEY TO GENERA OF HAWAIIAN EUCOILIDAE

1. Mesoscutum with notauli present, may be complete (Figure 1B) or reduced to anterior and posterior vestiges, (if so, posterior vestige consisting of at least a short median longitudinal carina); pronotum with a flat area laterad of true pronotal plate, bounded laterally by a ridge, ridge sometimes weakly developed; gaster without hair ring near base 2
- Mesoscutum usually without discernible notauli, rarely with notauli weakly indicated by fine longitudinal lines or rows of setae (if so, without a median longitudinal carina on posterior margin); pronotum without flat area laterad of pronotal plate; gaster usually with well-defined basal hair ring, sometimes sparse and incomplete dorsally 3

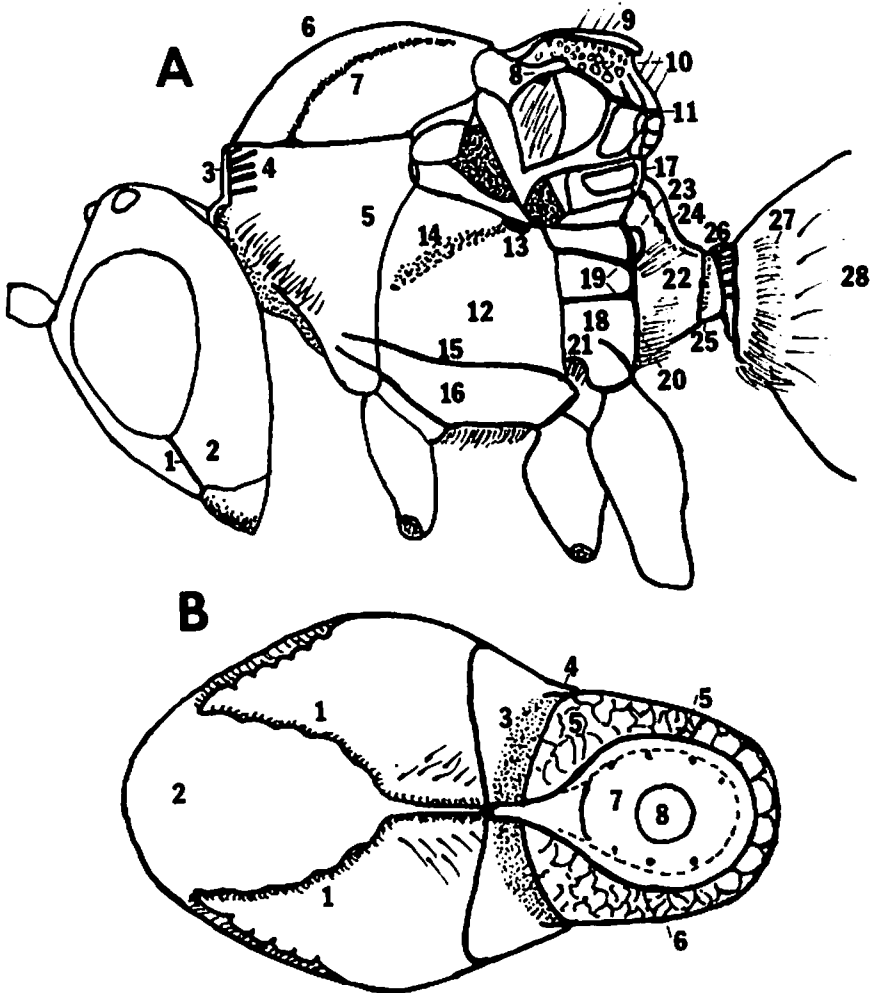


FIGURE 1. Morphological structures used in keys and descriptions; A, (modified from Nordlander 1982) lateral aspect of head, mesosoma and base of gaster of a hypothetical eucoilid: (1) malar suture, (2) malar space, (3) pronotal plate, (4) lateral ridges, (5) lateral part of pronotum, (6) mesoscutum, (7) notaulus, (8) lateral bar (part of axilla), (9) scutellar plate, (10) disc (dorsum) of scutellum, (11) scutellar margin, (12) mesopleuron (upper portion), (13) subalar pit, (14) subalar depression, (15) mesopleural sulcus or carina, (16) mesopleuron (lower portion), (17) metanotum, (18) metapleuron, (19) transverse ridges of metapleuron, (20) posterior margin of metapleuron, (21) anteroventral cavity, (22) propodeum, (23) lobe over propodeal spiracle, (24) dorsal sublateral carina, (25) basal portion of petiole, (26) expanded posterior portion of petiole, (27) basal hair ring of gaster, (28) second tergum of gaster; B, dorsum of mesothorax of *Gronotoma melanagromyzae* Beardsley, (1) notauli, (2) mesoscutum, (3) fovea of axilla, (4) lateral bar, (5) scutellar disc, (6) scutellar margin, (7) scutellar plate, (8) pit of scutellar plate.

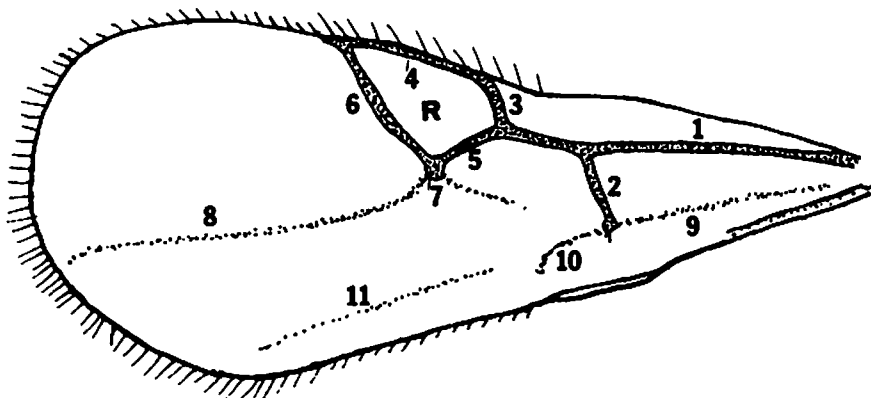


FIGURE 2. Forewing of an eucoilid to illustrate system of names applied to venation (terms in parentheses are the Comstock-Needham system) (1) subcostal vein (Sc + R1), (2) basal vein (Rs + M), (3) proximal vein of radial cell (R1), (4) marginal vein of radial cell (R1), (5) first (basal) abscissa of radius (2r), (6) second (distal) abscissa of radius (Rs), (7) areolar stub, (8) submarginal vein (M), (9) median vein (M + Cu), (10) discoidal vein (Cu), (11) subdiscoidal vein (Cul), (R) radial cell (marginal cell).

2. Flat area laterad of pronotal plate bordered laterally by a well-defined ridge (pronotal plate hardly distinguishable as separate from lateral flat areas in one species); notauli distinct over entire length or interrupted or evanescent only partially near midlength *Gronotoma* Förster
Flat area laterad of pronotal plate less well defined, the lateral ridge weakly indicated or discernible only near lower margin of pronotum; notauli indicated by short anterior and posterior vestiges in our species ... *Disorygma* Förster
3. Wing surfaces largely hairless, except for a few setae on veins and on wing margins; length 2.8 to more than 4 mm in our species *Eucoila* Westwood
Wing surfaces generally uniformly setose, occasionally partly hairless; length usually distinctly less than 3 mm 4
4. Forewing with distal abscissa of radius thickened, radial cell almost entirely open (Figure 4C), apical marginal setae elongate, ca $\frac{3}{4}$ as long as radial cell; female antenna 12-segmented; size very small (ca 0.8 mm long or less) *Micreriodes* Yoshimoto
Forewing not as above, if outer abscissa of radius thickened, then apical marginal setae shorter, no more than about $\frac{1}{2}$ as long as radial cell; female antenna 13-segmented; size usually larger 5

5. Radial cell of forewing completely closed on anterior margin (Figures 4B, D, F) 6
 Radial cell partly or completely open (i.e. marginal vein not discernible on at least distal portion of margin of radial cell) (Figures 4E, 9B)14
6. Thoracic pleura strigate or reticulate over almost entire surface; radial cell of forewing nearly 3 times as long as maximum width (Figure 4B); females with enlarged, bifid or trifid tarsal claws; associated with aquatic Diptera *Aspidogyrus* Yoshimoto
 Thoracic pleura entirely smooth or partially strigate; radial cell usually less than 3 times as long as maximum width; female tarsal claws simple 7
7. Scutellar plate relatively large, covering nearly entire dorsal surface of disc, nearly circular with subcentral pit (Figure 5); clypeus with small conical protuberance on lower margin; radial cell of forewing twice as long as broad (Figure 4D) *Ganaspidium* Weld
 Scutellar plate generally smaller, covering appreciably less than entire dorsal surface of disc, usually oval or elongate with a subapical pit; clypeus without conical protuberance on margin; radial cell often more elongate 8
8. Occipital region of head distinctly strigate dorsally as well as laterally; face longitudinally carinulate below antennal insertions; radial cell relatively broad (Figure 4D) *Chrestosema* Förster
 Occipital region usually smooth, occasionally weakly strigate laterally; face smooth below antennal insertions; radial cell often narrower 9
9. Pronotal plate with narrow, ridge-like lateral bridges connecting anterior and posterior sections, mesal bridge lacking in our species (Figure 9F); scutellar disc with well-defined carinae extending from plate to margin, largely smooth between carinae (Figure 9E) ... *Rhoptomeris* Förster
 Pronotal plate without lateral bridges, but with broad, flat mesal bridge connecting anterior and posterior parts; scutellar disc variously sculptured, but usually not as above10
10. Hair ring at base of gaster sparse laterally, broadly incomplete dorsally; male antenna with segment 4 curved, longer than 3; female antenna with 5 to 7 segmented club; ridge on posterior margin of metapleuron entire, not interrupted near midlength *Leptopilina* Förster
 Hair ring at base of gaster complete dorsally; male antenna (in species for which males are known) with segment 3 usually longer than 4, or subequal, segment 3 often

- curved but 4 uncurved; female antenna with or without distinct club; ridge on posterior margin of metapleuron interrupted near midlength (sometimes obscured by setae) 11
11. Segment three of female antenna usually distinctly shorter than four, sometimes subequal; head relatively short and broad; parasites of agromyzid leafminers in endemic host plants *Weldia* Yoshimoto
- Segment three of female antenna usually longer than four; head generally more globular; hosts various but apparently not attacking Agromyzidae 12
12. Female antenna with segments 4-7 very short (ca. 1.5 \times as long as wide), segment 8 abruptly wider than 7, segments 8-13 forming 6-segmented club; scutellar disc punctate-reticulate; wing veins very pale *Didyctium* Riley
- Female antenna with segments 4-7 usually longer, segment 8 not so abruptly wider than 7; scutellar disc variously sculptured, often carinulate or smooth; wing veins generally darker 13
13. Scutellar plate broadly oval, flat or slightly convex, without raised marginal rim, not appreciably downturned posteriorly (Figure 8); disc reticulate or punctate-reticulate *Ganaspis* Förster
- Scutellar plate generally more elongate, often with raised marginal rim, frequently downturned posteriorly; disc often carinulate at least basally, or smooth, sometimes rugose, reticulate or punctate-reticulate *Hypodiranchis* Ashmead (in part)³
14. Radial cell of forewing completely open (Figure 4E) 15
- Radial cell of forewing partly closed by marginal vein at base (Figure 9B) 16
15. Forewing truncate or emarginate at apex, proximal vein of radial cell very short and thick, length beyond juncture with radius not, or only slightly, greater than width (Figure 4E); hosts various, not in spider egg sacs *Kleidotoma* Westwood
- Forewing rounded at apex, proximal vein of radial cell longer, length equal to 3 times width or more; species with known hosts parasites of predaceous drosophilid larvae in egg sacs of endemic thomisid spiders *Nesodiranchis* Perkins

³Endemic Hawaiian forms which Yoshimoto (1962a) placed in the genera *Pseudeucoila* Ashmead and *Pseudodiranchis* Yoshimoto will key out here. These will be treated in a subsequent paper.

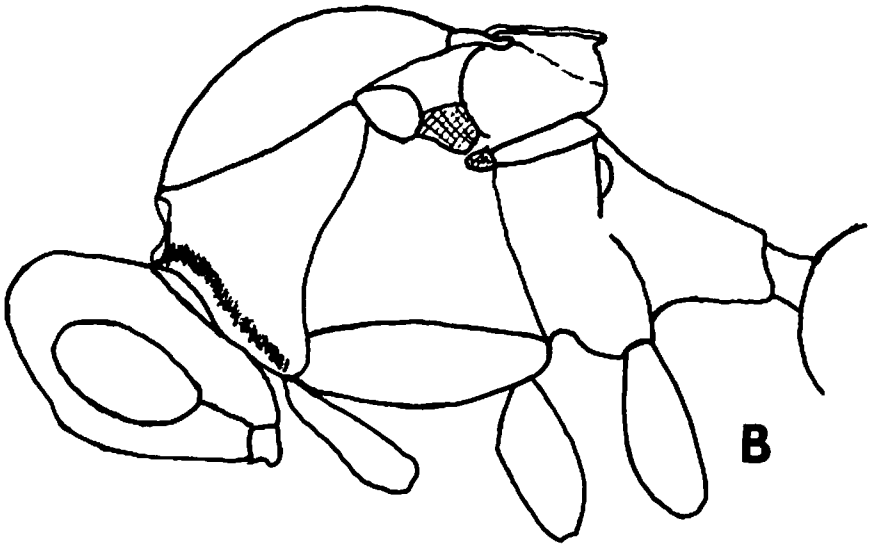
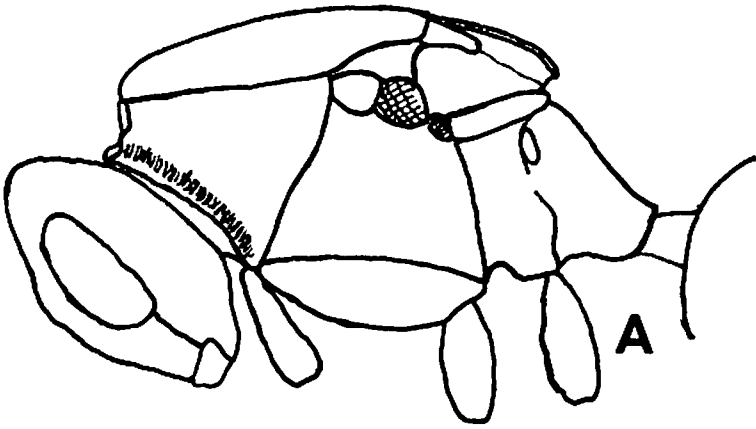


FIGURE 3. Lateral aspect of mesosoma; A, *Lispothyrsus* sp.; B, *Hypodiranchis* sp.

16. Very small species (1.0-1.3 mm long); female antenna with fairly well-defined 4 to 6-segmented club (Figure 9C)
 *Hexacola* Förster
 Usually larger species (about 1.5 mm long or longer), if small then female antenna without well-defined 5 or 6-segmented club 17
17. Scutum in lateral profile flattened (Figure 3A); scutellar plate not appreciably elevated above propodeum, smooth, shining, subapical pit very small or absent
 *Lispothyrus* Yoshimoto
 Scutum more strongly elevated (Figure 3B); scutellar plate usually distinctly raised, with a well-developed subapical pit *Hypodiranchis* Ashmead (in part)³

Genus *Chrestosema* Förster

Chrestosema Förster 1869, Verh. Zool.-Bot. Ges. Wien 19:344; Weld 1952, Cynipoidea (Hym.) 1905-1950:225.

Type species: *Chrestosema erythroga* Förster 1869.

Nordlander (1982) characterized the "*Chrestosema* group" for six genera, of which only *Chrestosema* is represented in Hawaii.

Chrestosema magnifica (Yoshimoto), **NEW COMBINATION** (Figure 4D).

Pseudeucoila (*Hexamocera*) *magnificus* Yoshimoto 1962, Pacific Insects 4:827. Type locality Hawaii (Oahu). Type in BPBM.

This species has several distinctive characteristics, some not mentioned in the original description, that distinguish it from other Hawaiian Eucilidae. The occipital area is finely, distinctly strigate, and the face is longitudinally carinate below the antennal tubercles. The lateral margin of the mesoscutum is flattened out into a thick, lineolate ridge with a shallow groove along its inner margin, which extends from about one-third of the way back on the scutum to the posterior margin. The pronotal plate is weakly, transversely strigate and the head is relatively elongate. The notauli, which are sometimes weakly indicated as shallow depressions in this genus, are not evident in *magnifica*. Also, on the metapleuron there is an unusual flat, flange-like lobe with a serrated, knife-like edge which extends to the posterior margin of the anteroventral cavity. I have not seen this structure in other Hawaiian eucilids.

A homotype of *magnifica* identified by me was sent to Dr. Nordlander in Sweden, who placed it as "a typical *Chrestosema* species".

Distribution: Known only from Hawaii (Oahu, Kauai, Hawaii) but probably an immigrant. In addition to the holotype from Mt. Tantalus,

³Endemic Hawaiian forms which Yoshimoto (1962a) placed in the genera *Pseudeucoila* Ashmead and *Pseudodiranchis* Yoshimoto will key out here. These will be treated in a subsequent paper.

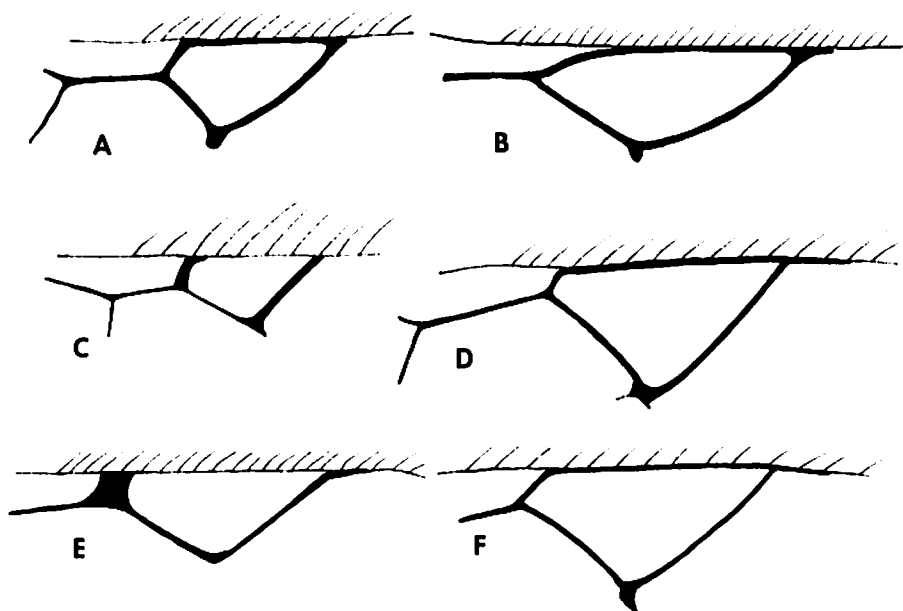


FIGURE 4. Radial cell of forewing; A, *Ganaspidium utilis*; B, *Aspilogyrus* sp.; C, *Micreriodes guamensis*; D, *Chrestosema magnifica*; E, *Kleidotoma suweyi*; F, *Didyctium weldi*.

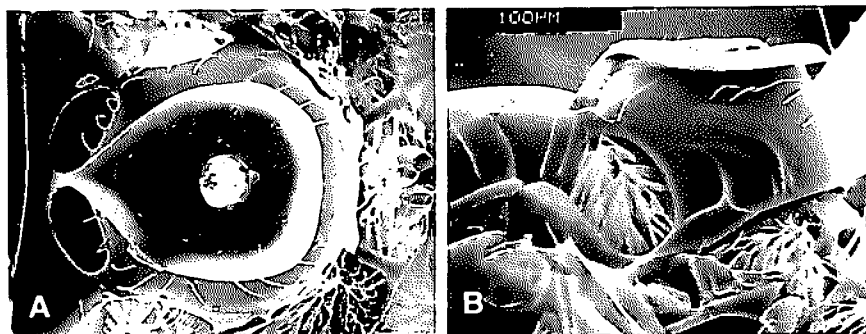


FIGURE 5. *Ganaspidium utilis*, scutellum; A, dorsal; B, lateral.

Oahu, I have collected three female specimens, as follows: Oahu, Wiliwilinui Ridge, 2,000 ft., 1960; Ewa (near sea level) VI•24•1969 and Hawaii, Kipuka Puauulu, 4,000 ft., Hawaii Volcanoes National Park VI•24•1966. An additional female was taken at Waimanu, Hawaii I., VI•7•1986 by S. Gon and J. Herr, in coastal strand zone. During May 1989, L. Masner collected six females on Kauai.

Hosts: Unknown.

Genus *Micreriodes* Yoshimoto

Micreriodes Yoshimoto 1962, Ins. Micronesia 19(3):96.

Type species: *Micreriodes guamensis* Yoshimoto.

The single species presently assigned to this genus has been known heretofore only from Guam. It also occurs in the Ryukyu Islands, based on the type locality of *Hexacola samuelsoni* Yoshimoto and Yasumatsu which is synonymized below.

Micreriodes guamensis Yoshimoto (Figure 4C).

Micreriodes guamensis Yoshimoto 1962, Ins. Micronesia 19(3):96. Type locality Guam. Type is USNM.

Hexacola samuelsoni Yoshimoto & Yasumatsu 1965. Pacific Insects 7:648, **NEW SYNONYMY**. Type locality Iriomote, Ryukyu Is. Type in BPBM.

M. guamensis can be readily distinguished from all other Hawaiian eucoilids by the combination of its very small size and the twelve-segmented female antenna (the male is unknown). Distinguishing characters of the forewing are the very long apical fringe setae, and the open radial cell with both the short proximal vein and the second (outer) radial abscissa conspicuously thickened (Figure 4C).

Two specimens of this minute species, both from light trap collections, indicate that it is probably established here. Both specimens are from Hickam Air Force Base, J. W. Beardsley collector, X•14•1978 and VI•1979. These were compared with the holotype of *guamensis* during 1985, and no significant differences were found. This is a new state record for Hawaii.

I compared the holotype of *Hexacola samuelsoni* with homotypes of *M. guamensis* and found them to be conspecific. Several paratypes of *H. samuelsoni*, also in BPBM, represent another species, and it appears that one of the latter was used as the basis for the illustration published with the description of *H. samuelsoni*. The USNM collection contains two specimens of *M. guamensis*, both labeled: Iriomote I., Ushiku-Mori, 7•XI•1963, G. A. Samuelson. One of these specimens was originally labeled as a paratype of *H. samuelsoni* and the other as a paratype of *H. cognata* Yoshimoto and Yasumatsu. These specimens were later identified and labeled as *Micreriodes* sp. by Dr. Nordlander. Examination of the holotype of *H. cognata*, also in BPBM, revealed that it is not conspecific with *M. guamensis*.

Hosts: Unknown.

Genus *Eucoila* Westwood

Eucoila Westwood 1833, Mag. Nat. Hist. 6:494; Weld 1952, Cynipoidea (Hymenoptera) 1905-1950:211; Yoshimoto 1962, Pacific Insects 4:842.

Type species: *Eucoila crassinerva* Westwood.

Yoshimoto (1962a) listed a single representative of *Eucoila*, *E. impatiens* (Say), from Hawaii. However, a second species, described below, has been present here at least since 1946. These are the largest Eucoilidae known to

be present in Hawaii. The adults of both species are associated with animal dung. *E. impatiens* has been reared from puparia of Sarcophagidae and Calliphoridae. *E. ophyrae*, n. sp., has been reared only from puparia of *Ophyra chalcogaster* (Wiedemann) (Muscidae).

Nordlander (1981) divided *Eucoila* into two groups; the "*crassinerva* group", based on the type species, and the "*nudipennis* group" based on *E. nudipennis* (Kieffer). Species of the *nudipennis* group exhibit two character states not found in the *crassinerva* group or in the related genus *Trybliographa* Förster; a reduction of the subalar pit of the mesopleuron and the absence of a hairless area just behind the postero-ventral corner of the metapleuron. Of the two Hawaiian species, *ophyrae* n. sp. falls in the *crassinerva* group while *impatiens* belongs with the *nudipennis* group. Nordlander (1981) suggested that the two groups may not be closely related.

KEY TO HAWAIIAN SPECIES OF EUCOILA

1. Side of pronotum behind pronotal plate with strong diagonal ridges (Figure 6B); pronotal plate with posterior (dorsal) margin strongly produced as a pair of semitriangular projections (Figure 7B); radial cell of forewing with marginal vein unpigmented, barely discernible, cell appearing open (Figure 7C) *E. ophyrae*, n. sp.
- Side of pronotum without such ridges; pronotal plate with posterior margin weakly produced as pair of rounded lobes (Figure 7A); radial cell with marginal vein pigmented or partly pigmented, cell closed *E. impatiens* (Say)

Eucoila ophyrae, new species (Figures 6, 7B-D).

Female: Length 3.5 mm (2.8-4.0 mm); forewing 3.1 mm. Head black; thorax dark reddish brown to black; gaster brown, darker dorsally; mandibles, antennae, legs and wing veins brown.

Head slightly narrower than thorax, ratio of width in dorsal aspect to length 8:5, width of front at narrowest point between eyes slightly less than twice width of compound eye (7:4), malar distance, measured along malar suture, about one-half height of compound eye. Malar space and genae behind eyes smooth, front with several fine ridge-like longitudinal carinulae below antennal insertions. Occipital margin marked by a strong, carinulate ridge laterally which broadens and flattens out dorsally, the carinulae diverging and extending almost to ocelli; mesal portion of dorsum of occiput behind ocelli with irregularly transverse rugae (Figure 6A). Antennae 13-segmented, segments 9-13 with distinct rhinaria, less well defined on segments 6-8; segments 1-5 appearing faintly, finely reticulate; segment 3 slightly longer than 4, apices of segments 3-12 becoming gradually wider, not forming a distinct club, segment 13 1.3 times as long as 12 (Figure 7D).

Pronotal plate well defined, with strong lateral ridges, posterior (dorsal) margin strongly produced as a pair of lateral subtriangular projections (Figure 7B). Sides of pronotum strongly, diagonally costate immediately behind lateral ridge of pronotal plate, about 5 strong ridge-like costae extend-

ing from pronotal plate to margin of mesoscutum (Figure 6B); anterior margin of pronotum laterad of anterior part of pronotal plate with a fringe of golden setae. Mesoscutum smooth, shining, with a few blunt-tipped golden setae. Scutellum with lateral bars strongly carinulate; basal fossae very large, deep, about one-half as long as disc, disc strongly reticulate-rugose, subtruncate behind, bearing a submarginal series of strong, blunt tipped setae; scutellar plate with anterior stem elongate, forming a narrow septum between basal fossae, rising abruptly at anterior margin of disc, extending about two-thirds distance to apex of disc, shape moderately elongate-oval with large subapical pit, surface anterior to pit slightly concave with two transverse ridges near middle, and bearing four strong blunt-tipped setae (Figure 6C). Mesopleuron smooth throughout except for well defined, ridge-like mesopleural carina. Wings hairless on both surfaces, except a few large setae on veins, and marginal fringe on posterior edge of hind wing and along outer angle of hind margin of forewing; minute raised brown dots (vestigial setal bases?) scattered on both surfaces of both wings. Forewing radial cell appearing completely open, although marginal vein indicated by faint unpigmented thickening; Cu indicated by diffuse, faintly pigmented streak (Figures 6D, 7C).

Gaster with well developed basal hair ring, complete dorsally; second tergum covering about four-fifths of gaster.

Male: unknown.

Described from 45 females. Holotype and 23 paratypes, Oahu, Univ. of Hawaii Campus (Honolulu), VI•2•1946, Y. Tanada, bred ex poultry manure; paratype, Oahu, Honolulu, VII•1948, C. E. Pemberton, on leaf; paratype, Honolulu, V•25•1955, C. R. Joyce; paratype, Oahu, John Rodgers (Honolulu International) Airport, VI•1958, E. J. Ford, light trap; paratype, Oahu, Pauoa Valley, VI•20•1961, R. Ota; 4 paratypes, Oahu, Ewa, II•25•1970, S. H. Au, ex chicken manure infested with flies; 12 paratypes, Oahu, Ewa, VI•27•1973, G. Toyama, ex puparia of *Ophyra chalcogaster*; paratype, Hawaii, Hilo, VIII•1•1946, E. C. Zimmerman, sugar plantation.

Distribution: Hawaii (Oahu, Hawaii). Presumed to be an immigrant of unknown origin.

Host: *Ophyra chalcogaster* (Wiedemann) (Muscidae). The host is widely distributed throughout the Ethiopian, Oriental and Pacific regions (Hardy 1981).

This species belongs to the "*crassinerva* group" within the genus *Eucoila* (Nordlander 1981). Dr. Nordlander, who examined specimens, reported (personal communication) that the large bidentate pronotal plate and the heavily sculptured occipital region of this species are features which distinguish it from other members of the *crassinerva* group.

***Eucoila impatiens* (Say) (Figure 7A).**

Diptolepis impatiens Say 1836, Boston Jour. Nat. Hist. 1:267. Type apparently lost.

Eucoila impatiens, Kotinsky 1907, Proc. Hawaii. Entomol. Soc. 1:121; Weld 1950, in Muesebeck et al., Hymenop. Amer. North of Mexico

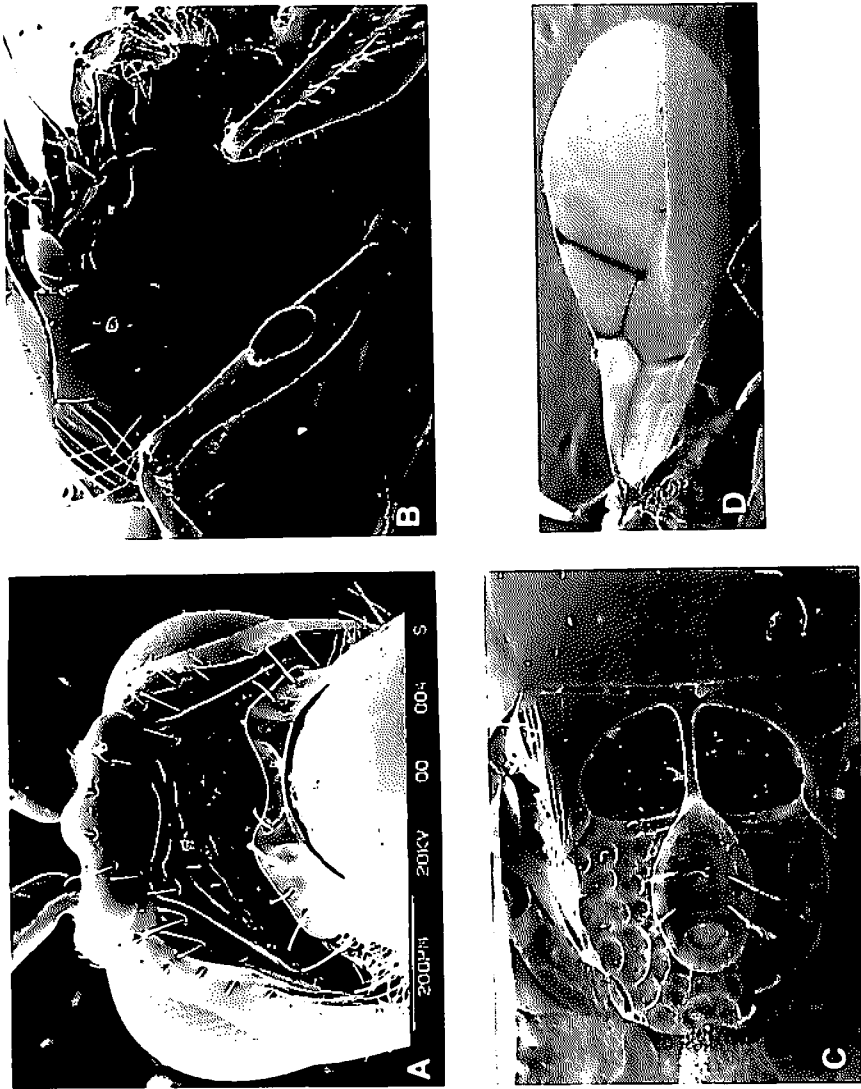


FIGURE 6. *Euroila ophyræ*; A, posterior aspect of head and pronotal plate; B, lateral aspect of mesosoma (ovoid body on front femur is a phoretic mite); C, dorsum of axillae and scutellum; D forewing.

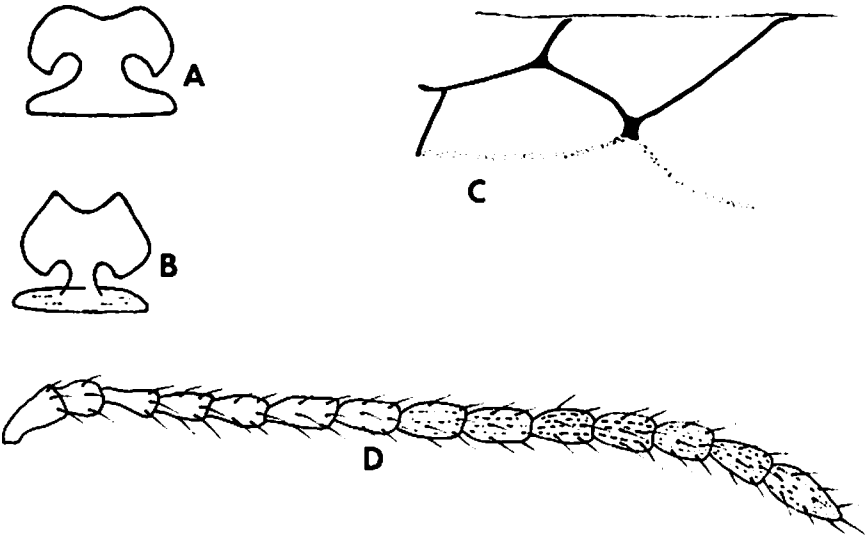


FIGURE 7. A, *Eucoila impatiens*, pronotal plate; B-D *Eucoila ophyrae*; B, pronotal plate; C, radial cell; D, antenna.

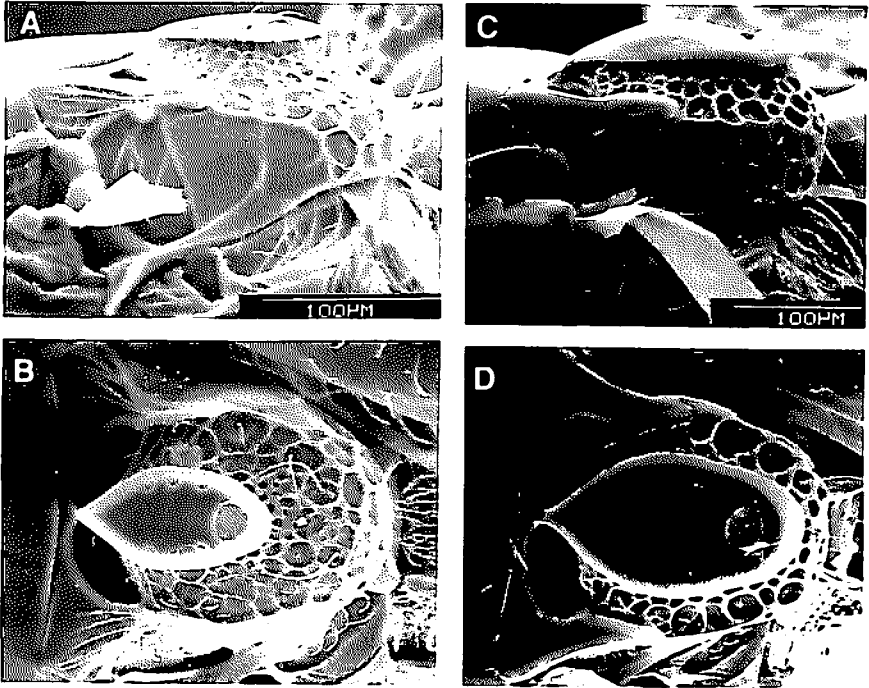


FIGURE 8. *Ganaspis* spp., scutellum; A-B, lateral and dorsal views of *G. ovata*; C-D, lateral and dorsal views of *G. xanthopoda*.

Synoptic Cat: 602; Yoshimoto, 1962, Pacific Ins. 4:842; Burks 1979, in Krombein et al, Cat. Hymenop. Amer. N. of Mexico 1:1053.

Both sexes were redescribed by Yoshimoto (1962). This species may be separated readily from *E. ophyrae* Beardsley, described above, by the characters given in the key to Hawaiian *Eucoila*.

Distribution: Hawaii (Hawaii, Kauai, Maui, Molokai, Oahu), North America. Purposely introduced into Hawaii from Arizona in 1906.

The name *Eucoila impatiens* has been used for this species since its introduction into Hawaii. Burks (1979) listed its distribution as "N.Y., Ill., Tex., N. Mex. Introduced into Hawaii." However, Menke (personal communication) indicated that the type is lost. The basis for the use of this name therefore is uncertain.

Hosts: Published host records for this species mostly are from "sarcophagid larvae" or from unspecified fly larvae associated with animal manure. Toyama and Ikeda (1976) reported rearing *E. impatiens* from several species of muscoid fly larvae associated with chicken manure and dead chickens. I have examined the specimens reared by these authors and found that those from the following hosts were correctly identified as *E. impatiens*: *Chrysomya megacephala* (Fabricius), *Chrysomya rufifacies* (Macquart), *Phaenicia cuprina* (Wiedemann) and *Parasarcophaga argyrostoma* (Robineau-Desvoidy). The first three are Calliphoridae, the last a Sarcophagidae. Yoshimoto (1962a) also listed a specimen from Waiopai, Maui reared by O. H. Swezey from "*Sarcophaga pallinervus* Thomson", a synonym of *Ravinia iherminieri* (Robineau-Desvoidy) (Sarcophagidae). Also, there is a specimen in the Hawaii State Dept. of Health collection which is labeled: Ewa (Oahu), VI-30-1973, ex pupa of *Ravinia iherminieri*, larva from cow dung, G. Toyama.

Genus *Ganaspis* Förster

Ganaspis Förster 1869, Verh. Zool.-Bot. Ges. Wien 19:355; Masner 1958, Casopis Ceskoslov. Společnosti Entomol. 55:264; Nordlander 1982, Entomol. Scandinavica 13:281.

Type species: *Ganaspis mundata* Förster.

Masner (1958) redefined the genus *Ganaspis* and redescribed and provided a key to eight Palearctic species. Nordlander (1980) removed one species treated by Masner, *G. subnuda* Kieffer, as a synonym of *Leptopilina heterotoma* (Thomson). The characters that separate *Ganaspis* from *Leptopilina* are discussed under the latter genus.

Two immigrant species of *Ganaspis* are known from Hawaii. One, *G. xanthopoda* (Ashmead), appears to be widely distributed in the Neotropical and Pacific regions. The second, *G. ovata* (Yoshimoto), was described from Hawaii and is known also from the South Pacific. The majority of the known endemic Hawaiian Eucolidae; those which are now placed in the genera *Hypodiranchis* Ashmead, *Lispothyrsus* Yoshimoto, *Nesodiranchis* Perkins, *Pseudodiranchis* Yoshimoto and *Weldia* Yoshimoto; belong to what Nordlander (1982) has called the *Ganaspis* complex. This group of genera includes

Hexacola Förster and *Didyctium* Riley, which are represented by apparently immigrant species in Hawaii.

KEY TO HAWAIIAN SPECIES OF GANASPIS

1. Scutellar plate smooth, shining, slightly convex, about $\frac{3}{4}$ as long as disc (Figure 8D); disc coarsely punctate-reticulate, relatively strongly elevated behind (Figure 8C); upper metapleural ridge well developed; female antennal segment 3 conspicuously longer than 4; marginal vein of forewing extending very little beyond apex of radial cell (Figure 10B) *G. xanthopoda* (Ashmead)

Scutellar plate less shiny, slightly more than one-half as long as disc (Figure 8B); disc less strongly sculptured, less elevated behind (Figure 8A); upper metapleural ridge weakly developed; female antennal segment 3 subequal to or slightly longer than 4; marginal vein of forewing extending beyond apex of radial cell for distance equal to about $\frac{1}{6}$ length of cell (Figure 10A) *G. ovata* (Yoshimoto)

Ganaspis ovata (Yoshimoto), **NEW COMBINATION** (Figures 8A-B, 10A).

Pseudeucoila ovata Yoshimoto 1962, Pacific Ins. 4:831. Type locality Hawaii (Hawaii I.). Type in BPBM.

Distribution: Hawaii (Kauai, Hawaii, Lanai, Maui, Molokai, Oahu), Samoa, Tonga. All specimens in the University of Hawaii collection (65) were taken at elevations of 2,000 feet or above, mostly in wet forest areas.

Hosts: unknown; probably Drosophilidae.

Ganaspis xanthopoda (Ashmead) (Figures 8CD, 10B).

Trybliographa xanthopoda Ashmead 1896, Proc. Zool. Soc. London for 1895:755. Type locality Granada. Type in USNM.

Ganaspis xanthopoda, Nordlander 1981, Entomol. Scand. 12:382.

Hexaplasta konensis Ashmead 1901, Fauna Hawaiiensis 1(3):304, **NEW SYNONYMY**. Type locality Hawaii (Hawaii I.). Type in BMNH.

Pseudeucoila (Pseudeucoila) vulgaris Yoshimoto 1962, Ins. Micronesia 19(3):103; Pacific Insects 4:833. Type locality Marshall Is. (Arno Atoll). Type in USNM.

Ganaspis konensis, Beardsley 1986, Proc. Hawaii. Entomol. Soc. 27:118.

Distribution: Hawaii (Kauai, Hawaii, Maui, Oahu), Granada, Puerto Rico, Central America, Micronesia, Samoa, Ryukyu Is., Japan. I have not examined the specimens upon which Yoshimoto's (1963, 1965) records from Samoa, Ryukyu Is. and Japan were based.

During 1986, Dr. Nordlander (personal communication) indicated that he believed Yoshimoto's *Pseudeucoila vulgaris* was a synonym of *G. xanthopoda*. In May 1987 I examined the holotype specimen of *xanthopoda*, which Nordlander had examined earlier. Although the gaster is missing from Ashmead's type, it appeared to be conspecific with Hawaiian specimens that

I had previously determined as *G. konensis* (Ashmead), with which *vulgaris* was earlier synonymized. This species probably is widely distributed in tropical and subtropical regions of the world.

Hosts: *Drosophila* spp. Hawaiian material examined included specimens from *Drosophila* puparia in strawberry guava and ordinary guava, and a series of specimens reared from leaf axils of *Freycinetia* with immatures of *Drosophila disjuncta* Hardy (Kawaipapa Gulch, 1100 ft., Hana, E. Maui, XII•14•1971, S. L. Montgomery). Yoshimoto (1962a) recorded this species from *Drosophila melanogaster* Meigen, and various unidentified drosophilid puparia associated with rotting fruit.

Genus *Didyctium* Riley

Didyctium Riley 1879, in Comstock, J. H., Report on Cotton Insects, p. 198; Weld 1962, Proc. Entomol. Soc. Wash. 63:280 (as subgenus); Burks 1979, Cat. Hymenop. America N. of Mexico, p. 1054 (as subgenus); Nordlander 1981, Entomol. Scand. 12:383 (as genus).

Type Species: *Didyctium zigzag* Riley.

This genus is represented in Hawaii by a single immigrant species.

Didyctium weldi (Yoshimoto), **NEW COMBINATION** (Figure 4F).

Pseudeucoila (*Pseudeucoila*) *weldi* Yoshimoto 1962, Ins. Micronesia 19(3):102.

Yoshimoto's *weldi* appears to be best placed in *Didyctium* even though the type species of that genus has an open radial cell. Recent students of the Eucolidae have discounted the generic significance of this character in other genera (Nordlander 1978, Quinlan 1978) and there seems to be no reason to consider it particularly significant in *Didyctium*. Dr. Nordlander examined a specimen of *weldi* and agreed that it should be placed in *Didyctium*. *D. weldi* resembles *D. zigzag* in having extremely pale wing veins, a large radial cell, short female antenna with a distinct six-segmented club, and gaster with a well developed basal hair ring. Also, both *zigzag* and *weldi* apparently develop as parasites of larval Phoridae.

Distribution: Hawaii (Oahu, Kauai), Micronesia. This species has not been reported previously in Hawaii. Ten Hawaiian females were examined, eight from lowland locations in and around Honolulu, the oldest collected IX•1956. Seven of these specimen were from light trap collections and one is labeled "ex old termite boring". Except for the latter, for which no collector is indicated, all Oahu specimens were collected by me. Two additional females are labeled Kauai, Anahola, IX•25•1987, G. K. Uchida, ex methyl eugenol trap. Identification was made through comparison with paratypes in BPBM.

Hosts: None of the Hawaiian specimens are directly associated with hosts. However, a specimen from Micronesia was recorded by Yoshimoto (1962) as a "parasite of phorids feeding on dead *Oryctes* larva." The association of one of the specimens from Honolulu with old termite borings is sug-

gestive of a relationship with the common phorid *Megaselia scalaris* (Loew). This fly has been frequently found associated with dead termites in infested structures which have been fumigated, where the larvae feed apparently on dead termites.

Genus *Hexacola* Förster

Hexacola Förster 1869, Verh. Zool.-Bot. Ges. Wien. 19:342, 349; Weld 1952, Cynipoidea (Hym.) 1905-1950, p. 209; Quinland 1978, Handbook Ident. British Insects 8(1b):24; Nordlander 1981, Ent. Scand. 12:385.

Type species: *Eucoela picicrus* Giraud (= *Hexaplasta hexatoma* Hartig; vide Nordlander 1981:385).

The genus *Hexacola* has not been reported previously in Hawaii. The four species which are treated below appear to be previously unreported immigrants. Their origins are unknown.

Hexacola belongs to the *Ganaspis* group of genera, as defined by Nordlander (1981). Weld (1952) separated *Hexacola* from *Hypodiranchis* Ashmead on the basis of the female antenna, which lacks a strongly developed club in *H. hawaiiensis* Ashmead, the type species of *Hypodiranchis*. *Hexacola* females have a 4-7 segmented club. The degree of club development in *Hypodiranchis* is relatively plastic however, and this genus is not clearly separable from *Hexacola*. The combination of a moderately to well developed female antennal club, small body size (approached in some undescribed *Hypodiranchis* species at hand), and an open radial cell will separate the four *Hexacola* species treated below from virtually all of the endemic Hawaiian *Hypodiranchis* spp. that I have seen, none of which possess all of these characters. However, a more comprehensive study of the *Ganaspis* group as a whole is required for a satisfactory resolution of the status of these genera.

KEY TO HAWAIIAN SPECIES OF HEXACOLA

1. Scutellar disc punctate or punctate-reticulate; female antenna with segments 4-7 very small, less than one half as long as shortest club segment 2
- Scutellar disc longitudinally carinulate; female antenna with segments 4-7 larger, at least some distinctly more than one half as long as shortest club segment 3
2. Female antenna with 4 or 5-segmented club, if five-segmented the basal club segment distinctly shorter than the four following segments *H. sp. no. 3*
- Female antenna with a six-segmented club, the basal club segment about the same size as the following segments *H. sp. no. 2*
3. Female antennal segment 8 distinctly wider than 7, the last six segments forming a fairly distinct club; legs, including coxae, yellowish *H. sp. no. 1*

Female antennal segment 8 only slightly wider than 7, slightly narrower than 9, last 4 segments (10-13) somewhat wider so that club seems as much four-segmented as six-segmented (Figure 9C); legs, including coxae, dark brownish *H. neoscatellae*, n. sp.

***Hexacola neoscatellae*, new species (Figures 9A-D).**

Female: Length 1.1 mm; forewing 1.2 mm. Body black, legs and antennae dark brown, wing veins brown.

Head smooth, shining, slightly narrower than thorax, width in dorsal aspect about 1.5 times length; front at narrowest about twice as wide as compound eye; malar space, measured on malar suture, equal to about $\frac{2}{3}$ height of eye, without striations. Antennae moderately elongate, about $\frac{3}{4}$ as long as body, segments all longer than wide, segment 3 longer than 4, 4 and 6 subequal, longer than 5; rhinaria discernible on outer five segments, segments 8-13 becoming gradually wider distally to form a weak club (Figure 9C).

Pronotal plate of normal form, separated from the pronotum laterally by a well-defined marginal ridge but without lateral ridges behind margin, posterior margin slightly concave mesally, mesal bridge and anterior part of plate faintly transversely striate. Mesoscutum smooth, shining; scutellum relatively short and broad, disc raised, longitudinally ridged, sharply declivous behind end of plate; plate relatively large, elongate-oval in outline (Figure 9A), extending about $\frac{1}{3}$ length of disc, moderately convex, the center slightly higher than sides, smoothly curved from front to rear, widest near midlength or slightly before, with a moderately large subapical pit and two small pits on each side anteriorly, surface otherwise smooth, shining. Mesopleuron smooth, shining, with a strong, slightly curved longitudinal ridge marking lower margin. Metapleuron without longitudinal carinae except along upper margin, posterior margin weakly depressed along central part; details in this area partially obscured by moderately long setae along posterior margin of metapleuron. Propodeal carinae nearly parallel, slightly convergent posteriorly, area between with sparse setae.

Forewing with radial cell moderately elongate, more than twice as long as wide, closed at base, the marginal vein becoming evanescent and disappearing before midlength of cell (Figure 9B); apical fringe setae about $\frac{1}{4}$ as long as radial cell.

Gaster with basal hair ring complete dorsally, forming a band several (2-4) setae wide, but not conspicuously woolly, anterior row of setae longest, distinctly recurved posteriorly toward apices. Second tergum enclosing most of gaster, posterior segments exposed apically.

Male: Similar to female but a trifle smaller; antennae as long as body, third segment elongate, strongly curved, with outer face smoothly excavate, about twice as long as segment 4 (Figure 9D).

Described from nine specimens. Holotype female, allotype male, one male and one female paratypes: Oahu, Waimanalo, VIII-4-1983, D. Oi, reared from puparia of *Neoscatella terryi* (Cresson) from hydroponically

grown watercress. Female paratype: Oahu, Hickam Air Force Base, VI•1979, J. W. Beardsley, light trap. Four male paratypes: Kauai, Lihue, VI•26•1973, D. Sagawa, ex peat pots.

This species lacks obvious adaptations for aquatic existence, such as densely ciliate forewings, which are present in other Hawaiian eucoilids that parasitize aquatic immature Diptera. However, one collection was reared from puparia of an ephydrid fly, *Neoscatella terryi*, from an aquatic environment. This association was confirmed by me as I dissected one of the male paratypes directly from a *N. terryi* puparium which was included in this collection. Even though *N. terryi* is presumed to be endemic to Hawaii, *Hexacola neoscatellae* may be an immigrant of recent origin as it does not appear to be closely related to any known endemic species group. This species differs from Quinlan's (1978) description of *H. hexatoma* Hartig (which Nordlander, 1981, found to be a synonym of the type species, *Eucoila picicurus* Girard) in several respects; eg: the antennae are not pale basally, and do not have a clearly defined six segmented club with rhinaria on all six segments; the back of the head is not discernibly striate, and the basal hair ring of the gaster is not dense.

Hexacola neoscatellae has not been directly compared with type specimens of other described species which have been placed in this genus. However, it differs from the published descriptions of all others known from the Pacific area (Yoshimoto 1963, Yoshimoto and Yasumatsu 1965). A revisionary study of the entire genus will be necessary to clarify the relationship of this and other Pacific area *Hexacola* species.

The following three species are each represented by a unique female. The circumstances of their collection suggest that these species probably are established in Hawaii. However, because of the paucity of the material, they are not being formally named at this time.

Hexacola sp. no. 1. A single female, in good condition, is labeled: Oahu, Waipio Peninsula, X•24•1965, J. W. Beardsley collector.

Hexacola sp. no. 2. A single female, in fair condition, is labeled: Oahu, Honolulu, X•7•1976, J. Stein collector, light trap. This species appears to be close to *H. cognata* Yoshimoto and Yasumatsu from the Ryukyu Islands. It was compared with the type of *cognata* by me. Morphological differences between the two suggest that they are not conspecific.

Hexacola sp. no. 3. A single female¹, in good condition, is labeled: Oahu, Manoa (Valley), IV•24•1984, M. Early collector, ex soil under cat carcass, stage: dry, day:30. The size of the specimen and the collection data suggest that this is a parasite of some small necrophagous fly larva.

¹Two additional females were collected on Oahu during 1988. Both the proximal and distal veins of the radial cell are thickened in this species, suggesting a possible relationship with *Micreriodes*.

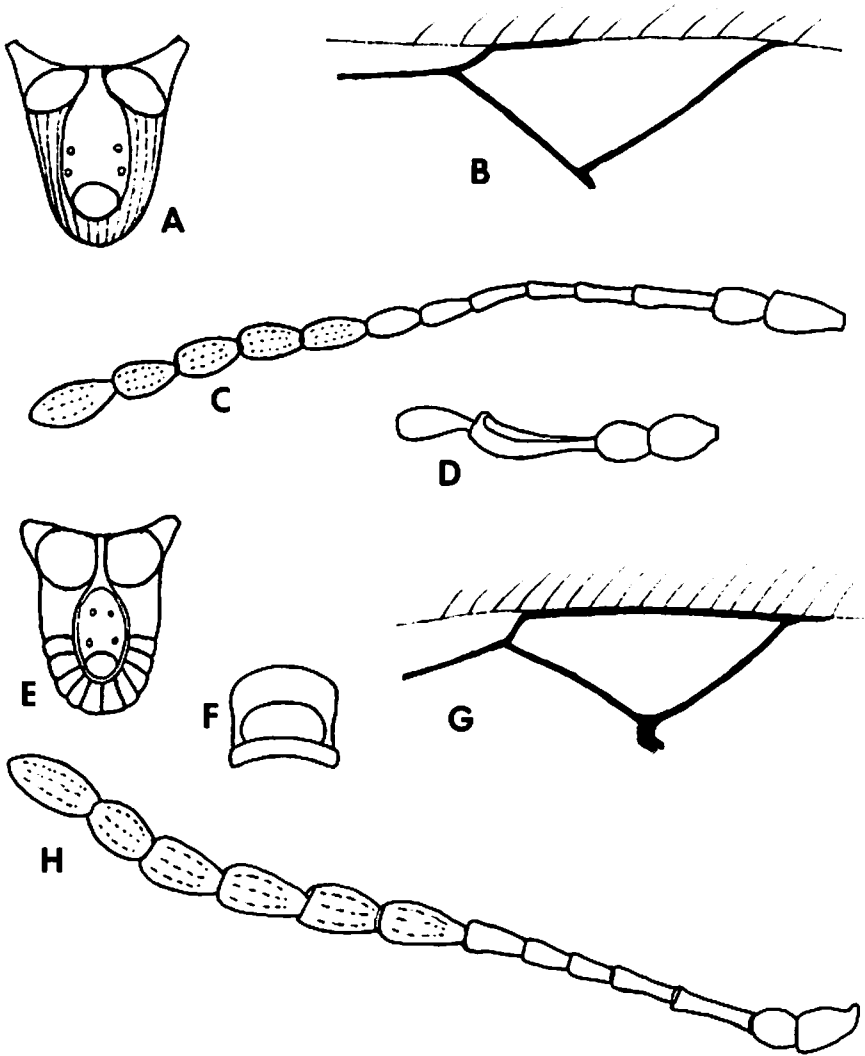


FIGURE 9. A-D, *Hexacola neoscatellae*; A, dorsal view of scutellum; B, radial cell of forewing; C, female antenna; D, basal segments of male antenna; E-H, *Rhoptomeris advena*; E, dorsal view of scutellum; F, pronotal plate; G, radial cell of forewing; H, female antenna.

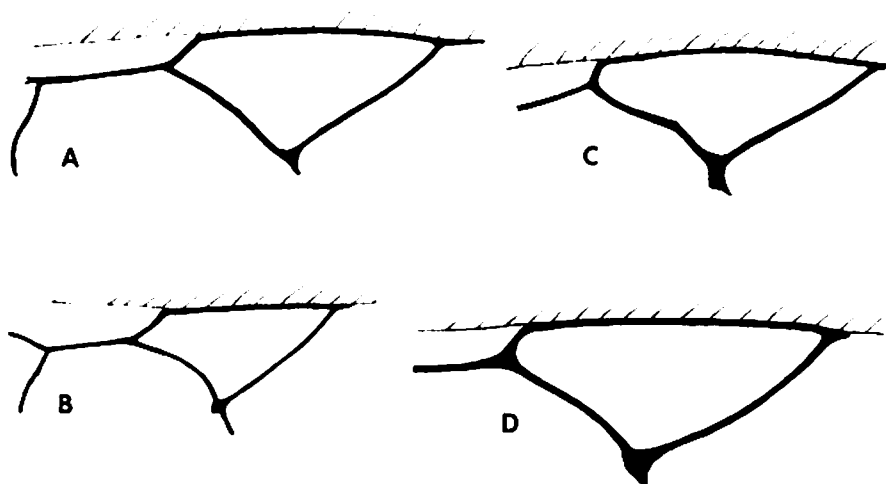


FIGURE 10. Radial cell of forewing: A, *Ganaspis ovata*; B, *G. xanthopoda*; C, *Leptopilina boulandi*; D, *L. rugipunctata*.

Genus *Leptopilina* Förster

Leptopilina Förster 1869, Verh. Zool.-Bot. Ges. Wien. 19:342; Nordlander 1980, Entomol. Scand. 11:436.

Type species: *Cothonaspis longipes* Hartig.

Nordlander (1980) redefined *Leptopilina*, assigned nine species to it, and provided redescrptions and a key to the five known European species. He also compared *Leptopilina* with the type species of *Ganaspis*, a genus which it superficially resembles. Nordlander's work on *Leptopilina*, and some of his more recent papers (1982, 1982a) have pointed out several important characters that differentiate this genus from *Ganaspis* and related genera. These include the male antenna, which in *Leptopilina* has the fourth segment enlarged, generally longer than third, and often curved. In the *Ganaspis* group the third segment is normally the one so modified. In *Leptopilina* the posterior portion of the petiolar segment of the gaster is abruptly enlarged, but not in *Ganaspis* and related genera. Also, in *Leptopilina* the basal hair ring of the gaster is broadly interrupted dorsally, whereas it is complete or nearly so in *Ganaspis*. Most *Leptopilina* species have the posterior margin of the metapleuron defined by a complete ridge, but in the *Ganaspis* group the middle section of the margin is broadly depressed, and the ridge is interrupted.

Both *Ganaspis* and *Leptopilina* are associated with *Drosophila* in Hawaii. These species were placed by Yoshimoto (1962) in the genus *Pseudeucoila* Ashmead which Nordlander (1981) has shown is a synonym of *Trybliographa* Förster, a genus not known to be present in Hawaii.

KEY TO SPECIES OF LEPTOPILINA KNOWN FROM HAWAII

1. Scutellar disc with semidiagonal, costate sculpture, plate with a relatively large apical pit with a nearly transverse anterior margin (Figure 11A); female antenna with segments 5 and 6 relatively short, 5 slightly more than one-half as long as 4, less than half as long as 3; radial vein of forewing usually with a slight but distinctly angulate downturn at about two-thirds of its length (Figure 10C) *L. boulardi* (Barbotin et al.)
- Scutellar disc more distinctly reticulate-rugose, plate with a slightly smaller, rounder pit (Figure 11C); female antenna with segments 5 and 6 more elongate, 5 only slightly shorter than 4, more than half as long as 3; radial vein usually with a slight, smooth, downward curve, but not angulate (Figure 10D) *L. rugipunctata* (Yoshimoto)

Leptopilina boulardi (Barbotin, Carton and Kelner-Pillault) (Figures 10C, 11A-B).

Cothonaspis (*Cothonaspis*) *boulardi* Barbotin, Carton and Kelner-Pillault 1979, Bul. Entomol. Soc. France 84:20.

Charips mahensis Kieffer 1911, Trans. Linn. Soc. London, ser 2, Zool. 14:312. preoccupied in *Leptopilina* by *Erisphagia mahensis* Kieffer 1911, vide Nordlander 1980, Entomol. Scand. 11:432.

Leptopilina boulardi, Nordlander 1980, Entomol. Scand. 11:432.

This species was redescribed in detail by Nordlander (1980), and identification of Hawaiian specimens has been confirmed by him (personal communication).

Distribution: Hawaii (Kauai, Hawaii, Maui, Oahu) Africa, Europe, North America, South America; probably nearly cosmopolitan wherever its hosts occur. The oldest Hawaiian specimen seen is labeled: Oahu, Ewa, VI-19-1961, J. W. Beardsley, light trap. There are over 100 specimens in the University of Hawaii and Hawaii State Department of Agriculture collections, mostly from light trap collections on Oahu (Ewa, Hickam Air Force Base, University of Hawaii Campus, etc.) and from fruit collections from Kokee, Kauai, 3600 feet. It has not been reported previously in Hawaii and is a new state record.

Hosts: Nordlander (1980) has summarized the bionomics of this species. Its principal host is *Drosophila melanogaster* Meigen. Apparently, it is quite host specific. It may also attack other species in the *D. melanogaster* subgroup, but less successfully. Local collections contain specimens reared from fruit (papaya, *Passiflora molissima*), but not specifically from *Drosophila*.

Leptopilina rugipunctata (Yoshimoto), **NEW COMBINATION** (Figures 10D, 11C-D).

Pseudeucoila (*Pseudeucoila*) *rugipunctata* Yoshimoto 1962, Ins. Micronesia 19(3):98; Yoshimoto 1962, Pacific Ins. 4:831. Type locality Marshall Is. (Jaluit Atoll). Type in USNM.

I have examined specimens from Micronesia (including the holotype) and Hawaii, determined by Yoshimoto as *Pseudeucoila rugipunctata*. On the basis of the structure of the male antennae, the form of the scutellar plate, the reduced basal hair ring of the gaster, and the form of the metapleuron, this species clearly belongs in the genus *Leptopilina*, as redefined by Nordlander (1982). Dr. Nordlander has seen specimens which I determined as this species, and confirmed placement in *Leptopilina*. It does not appear to be identical to any of the European species which he redescribed.

Distribution: Hawaii (Hawaii, Kauai, Maui, Molokai, Oahu), Micronesia, Samoa, Fiji, Ryukyu Is., Japan. I have not checked specimens listed as this species by Yoshimoto (1963, 1965) from Samoa, Fiji, the Ryukyu Is. or Japan.

Hosts: No specific host records are available for this species. Most likely, it is a parasite of one of more immigrant *Drosophila* species.

Genus *Rhoptomeris* Förster

Rhoptomeris Förster 1869, Verh. Zool.-Bot. Ges. Wien 19:344, 356; Nordlander 1978, Entomol. Scand. 9:47-62.

Hexamerocera Kieffer 1901, Feuille jaun. Nat. 31:174 (Synonymy by Nordlander 1978).

Type species: *Cothonaspis heptomus* Hartig.

Nordlander (1978) redefined the genus *Rhoptomeris*, based on the type species, and included three additional European species. One of these, *Eucoila rufiventris* Giraud, is the type species of Kieffer's subgenus *Hexamerocera*. The latter name was used by Yoshimoto, as a subgenus of *Pseudeucoila*, for a Hawaiian species (*P. magnifica* Yoshimoto) which I have transferred to the genus *Chrestosema*.

The peculiar form of the pronotal plate, with the median bridge reduced or absent and with lateral bridges usually present, is a distinguishing characteristic of *Rhoptomeris*. The males have the third antennal segment shorter than the fourth, as in *Leptopilina*. Females have the basal hair ring of the gaster complete dorsally, not incomplete as in *Leptopilina*.

Rhoptomeris is represented in the Hawaiian fauna by a single, presumably immigrant, species, which does not appear to be identical with any of those treated by Nordlander. The species is described as new below. It appears to have been present in Hawaii for many years (the oldest specimen seen was collected in 1913), but has not been recognized previously.

***Rhoptomeris advena*, new species (Figures 9E-H).**

Female: Length 1.2 mm (1.1-1.3), forewing 1.2 mm. Color dark brown to black; legs pale yellowish; antennae with outer segments dark brown, basal segments paler; wing veins brownish.

Head globular, smooth, shining, without striations, about as wide as thorax, in dorsal aspect about $\frac{2}{3}$ as long as broad; width of front between eyes at narrowest about twice as wide as eye; malar space measured on malar suture equal to about one-half height of eye, smooth. Antennae about $\frac{3}{4}$ as

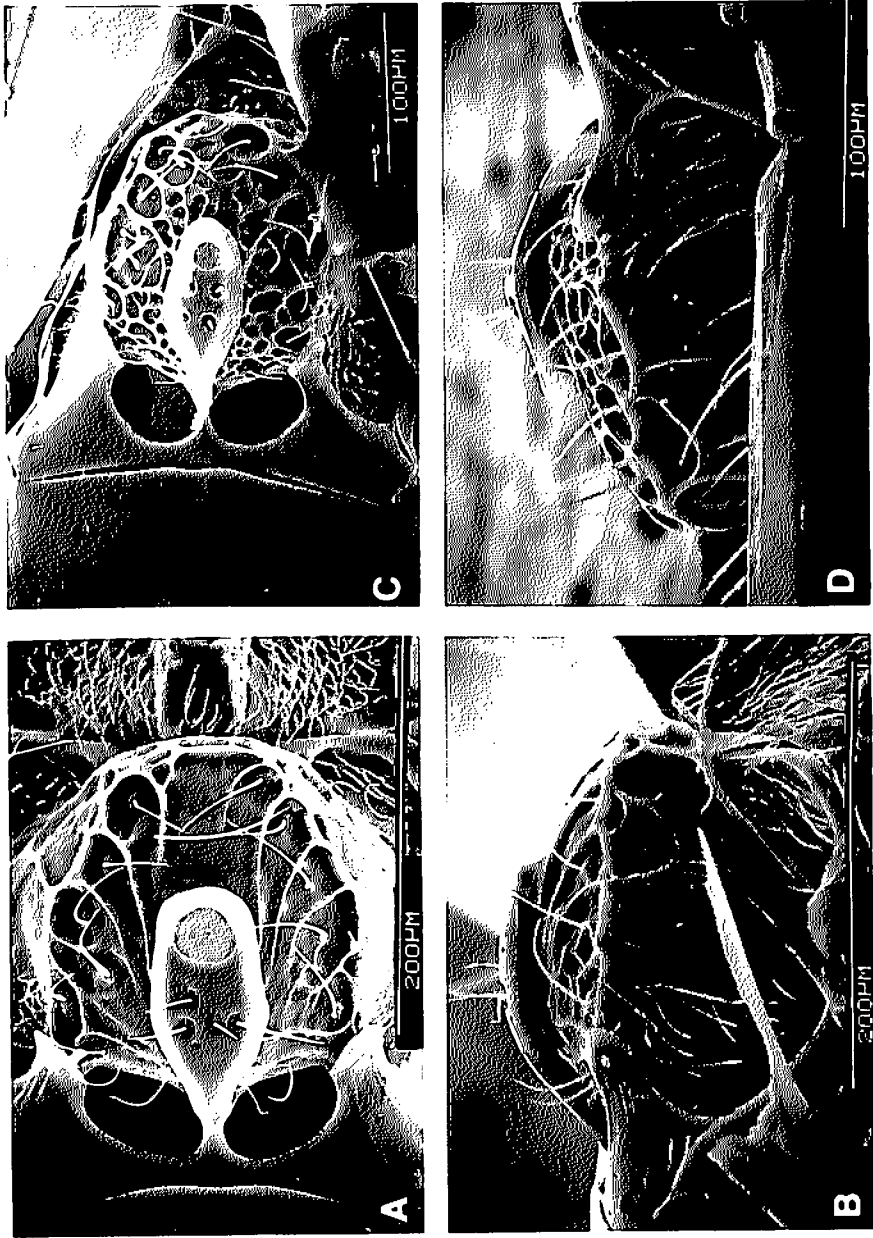


FIGURE 11. *Leptopilina* spp., scutellum; A-B, dorsal and lateral views of *L. boulandi*; C-D, dorsal and lateral views of *L. rugipunctata*.

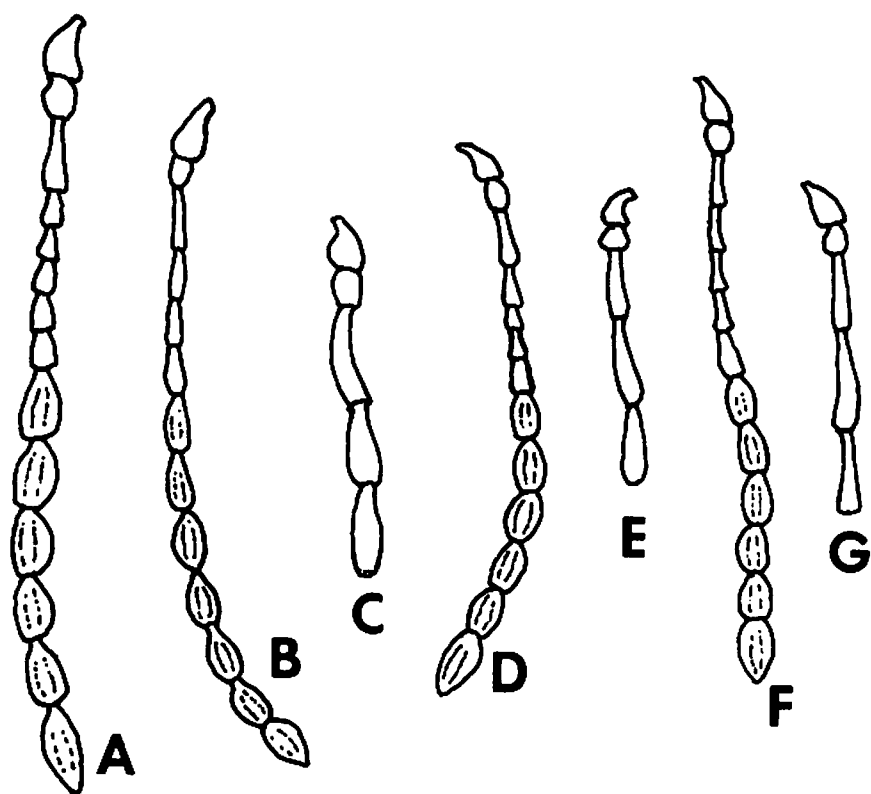


FIGURE 12. Antennae. A, *Didactium weldi* female; B, *Ganaspis xanthopoda* female; C, *G. xanthopoda* male, basal segments; D, *Leptopilina boulardi* female; E, *L. boulardi* male, basal segments; F, *Leptopilina rugipunctata* female; G, *L. rugipunctata* male, basal segments.

long as body; six outer segments of approximately equal diameter, forming a distinct club, segment 7 somewhat narrower, but broader than 6, segment 3 about 1.3 times as long as 4 (Figure 9H).

Pronotal plate with posterior lobe relatively narrow, the mesal bridge apparently absent, and with narrow lateral bridges connecting to anterior portion of plate (Figure 9F), dorsal and lateral margins of posterior section of plate forming a distinct ridge, with a series of very short fine longitudinal lateral ridges behind the marginal ridge on each side. A dense line of pale setae present along ventral margin of pronotum, below pronotal plate. Mesoscutum not very strongly raised, smooth, shining; scutellum (Figure 9E) with basal foveae rather shallow, disc moderately well developed, rounded, slightly protruding behind, distinctly coarsely reticulate with strong ridging extending laterally from plate, smooth between ridges, with a well defined ridge marking ascutellar margin, forming lateral closure of cells formed by ridges extending from plate; scutellar plate fairly large, extending about

$\frac{3}{4}$ length of disc, oval in outline, nearly flat, not appreciable downturned apically, with a large subapical pit and four small pits anteriorly, with a weakly developed marginal rim, most evident anteriorly. Mesopleuron smooth, shining. Metapleuron with a distinct longitudinal carina extending from propodeal spiracle, not reaching anterior margin of metapleuron; anteroventral cavity present, with a few small fine hairs but not densely hairy; posterior margin of metapleuron not depressed mesally, defined by a distinct ridge. Propodeum with a dense tuft of short, fine setae on lower portion of anterior margin just behind lower end of mesopleuron.

Forewing with radial cell relatively long and narrow (Figure 9G), marginal fringe setae longest along outer posterior angle of wing, about $\frac{1}{3}$ as long as radial cell.

Gaster with basal hair ring complete dorsally where it consists of a single closely set line of pale setae with recurved apices; lateral portion of band with a few very short fine setae behind anterior row.

Male: Unknown.

Described from four specimens. Holotype female: Oahu, Waipio Peninsula, X•24•1965, J. W. Beardsley. Female paratype: Oahu, Honolulu, I•7•1913, O. H. Swezey. Two female paratypes: Molokai, Halawa, III•20•1966, C. M. Yoshimoto.

Rhoptomeris advena will not run in Nordlander's key (1978) to European species. The metapleural anteroventral cavity is present but devoid of conspicuous setae. The pronotal plate, like that of *R. rufiventris* (Giraud) (as illustrated by Nordlander), lacks a mesal bridge. However, the lateral bridges are present (Figure 9F). The scutellar plate is broader and less tear-shaped than in any of the four European species illustrated by Nordlander.

Hosts: Unknown.

Genus *Aganaspis* Lin

Aganaspis Lin 1987, Taiwan Agric. Res. Inst. Spec. Pub 22:68.

Type Species: *Tybligrapha daci* Weld.

***Aganaspis daci* (Weld).**

Tybligrapha daci Weld 1951, Proc. Hawaii. Entomol. Soc 14:331.

Aganaspis daci, Lin 1987, Taiwan Agric. Res. Inst. Spec. Pub. 22:72.

Aganaspis daci is not included in the key as apparently it is not established in Hawaii. Introductions and liberations of this species for biological control of Oriental fruit fly, *Dacus dorsalis* Hendel, were made in Hawaii during 1949-1952. Approximately 35,000 individuals were released during that period (Bess et al 1961), but the species has never been recovered in the field. *A. daci* apparently is of Malaysian origin. Related species are known from Taiwan (Lin 1987).

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